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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,122	11/18/2003	Tadayoshi Tominaga	03194	2753

23338 7590 01/03/2007

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EXAMINER	
MAI, NGOCLAN THI	
ART UNIT	**PAPER NUMBER**
1742	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/715,122	TOMINAGA ET AL.	
	Examiner	Art Unit	
	Ngoclan T. Mai	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5,6 and 9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1,3,5,6 and 9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/10/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/13/06 has been entered.

2. In the amendment applicant canceled claim 7 and added claim 9. Accordingly, claims 1, 3, 5-6 and 9 are pending.

3. Upon further consideration, the rejection of claims 1, 3, 5-6 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn per declaration of under 37 CFR 1.132 by the applicants because the examiner agrees that it is known to those skill in the art that the proper unit for measurement of the parameter Rz is micrometer. The objection to the specification under 35 U.S.C. 132(a) is also withdrawn for the same reason.

4. Upon further consideration, the claims are rejected as follows.

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

6. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Dong et al. (U.S. Patent No. 6,210,807, art of record).

Dong discloses surface treating titanium article by gas oxidation at a temperature in the range of 500-725 C for 0.5 to 100 hrs to produce an adherent surface compound layer

containing at least 50% by weight of oxides of titanium having a rutile structure and a thickness of 0.2 to 2 micron, col. 3, l. 2-10. Dong also teaches the treatment may be effect at about 660 –700 C for about 0.1 to 8 hrs, for example treatments about 2.5 hrs at about 700 C or about 5 hrs at about 680 C both produce a surface compound layer having a thickness of about 1 micron and an oxygen diffusion zone having a depth of about 10 microns, col. 3, lines 28-34. Dong also discloses after conducting heat treating a testpiece air for 100 hrs at 600 C, the testpiece had a surface compound layer formed mainly of TiO2 of rutile structure and having a thickness of about 2 micron; below the thin surface compound layer, there was an oxygen diffusion zone forming a hardened layer extending down to a depth of about 15 micron, col. 4, l. 20-31. Dong also teaches a graph plotting micro hardness against the distance from the surface of the in micrometers, Fig. 1 and a graph plotting the titanium and oxygen contents in wt.% at various distance from the surface also in micron, Figure 2, col. 4, l.31-36. Dong therefore teaches determining an effective thickness of hard oxide film from a correlation of the hardness against the film thickness of the hard oxide film.

While Dong does not specifically teach determining an effective surface roughness of the hard oxide film, Dong discloses an optical micrograph of a fracture section of a TO treated testpiece shows that the surface compound layer is adherent and dense, col. 5, l. 15-21, figure 7 and is uniform on the substrate of the titanium part, col. 5, l. 21-23, Figure 8. Note that uniformity of the surface layer appears to indicate the that little or lower surface roughness. Dong therefore visually determining the effective surface roughness of the hard oxide film.

Claim Rejections - 35 USC § 103

7. Claims 1, 3, 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dong et al. Dong discloses surface treating titanium article by gas oxidation at a temperature in the range of 500-725 C for 0.5 to 100 hrs to produce an adherent surface compound layer containing at least 50% by weight of oxides of titanium having a rutile structure and a thickness of 0.2 to 2 micron, col. 3, l. 2-10. Dong also teaches the treatment may be effect at about 660 –700 C for about 0.1 to 8 hrs, for example treatments about 2.5 hrs at about 700 C or about 5 hrs at about 680 C both produce a surface compound layer having a thickness of about 1 micron and an oxygen diffusion zone having a depth of about 10 microns, col. 3, lines 28-34. Dong also discloses after conducting heat treating a testpiece air for 100 hrs at 600 C, the testpiece had a surface compound layer formed mainly of TiO2 of rutile structure and having a thickness of about 2 micron; below the thin surface compound layer, there was an oxygen diffusion zone forming a hardened layer extending down to a depth of about 15 micron, col. 4, l. 20-31. Dong also teaches a graph plotting micro hardness against the distance from the surface of the in micrometers, Fig. 1 and a graph plotting the titanium and oxygen contents in wt.% at various distance from the surface also in micron, Figure 2, col. 4, l.31-36. Dong therefore teaches determining an effective thickness of hard oxide film from a correlation of the hardness against the film thickness of the hard oxide film.

While Dong does not specifically teach determining an effective surface roughness of the hard oxide film, Dong discloses an optical micrograph of a fracture section of a TO treated testpiece shows that the surface compound layer is adherent and dense, col. 5, l. 15-21, figure 7 and is uniform on the substrate of the titanium part, col. 5, l. 21-23, Figure 8. Note that uniformity of the surface layer appears to indicate the that little or lower

surface roughness. Dong therefore visually determining the effective surface roughness of the hard oxide film.

Dong differs from claim 1 is that Dong does not teach the effective surface roughness of the hard oxide film is 3 micron or less.

Dong however discloses that in surface treatment of titanium part it is known that at a temperature high enough to achieve an appreciable hardending effect, a considerable amount of "scale" is formed and the fatigue strength is also reduced, col. 1, lines 26-32. Note that scale is defined as flaky oxide film formed on a metal, heated to a high temperature Webster's II, New Riverside University Dictionary). In another word the scale on the surface can be seen as the surface of the titanium part as being rough. Since the surface roughness reduces the fatigue strength of the titanium part, it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the surface roughness of the oxide film of Dong against the hardness and from that determination of an effective roughness of the oxide film as recited in claim 3. From that determination it is expected that the surface roughness of Dong would be in the same amount as claim.

Regarding claim 6, Dong discloses shot peening the resultant treated article, col. 4, l. 5-7and claim 10.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoclan T. Mai whose telephone number is (571) 272-1246. The examiner can normally be reached on 9:30-6:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ROY KING
SUPERVISORY PATENT EXAMINER
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